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Recommendations and guidelines pertinent to effective planning and construction of school plants in Rhode Island are outlined. Recommendations as to the development of facilities needs, organization and functions of the planning committee, and planning for pupil and curriculum needs are considered as the basic frame of reference. General guidelines are suggested for meeting instructional needs, conserving funds, maintaining health and safety, planning for flexibility, designing buildings for multiple use, maintaining buildings for increased durability, adding to buildings when needed, and providing for emergency shelters. Location, size, shape, engineering characteristics, health and safety requirements and public value of school sites are discussed as important criteria. Instructional areas i.e. number and size of rooms in elementary school and secondary school buildings, are discussed at length. Auxilliary instructional areas--libraries, auditorium, and cafeteria--and auxiliary areas--guidance and counseling, administration, health, storage, staff lounge and workrooms, student workrooms and activity rooms--are considered. Instructional aids and service facilities are treated in separate chapters. A bibliography includes basic texts and general references. (FPO)

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SCHOOL PLANT PLANNING GUIDE

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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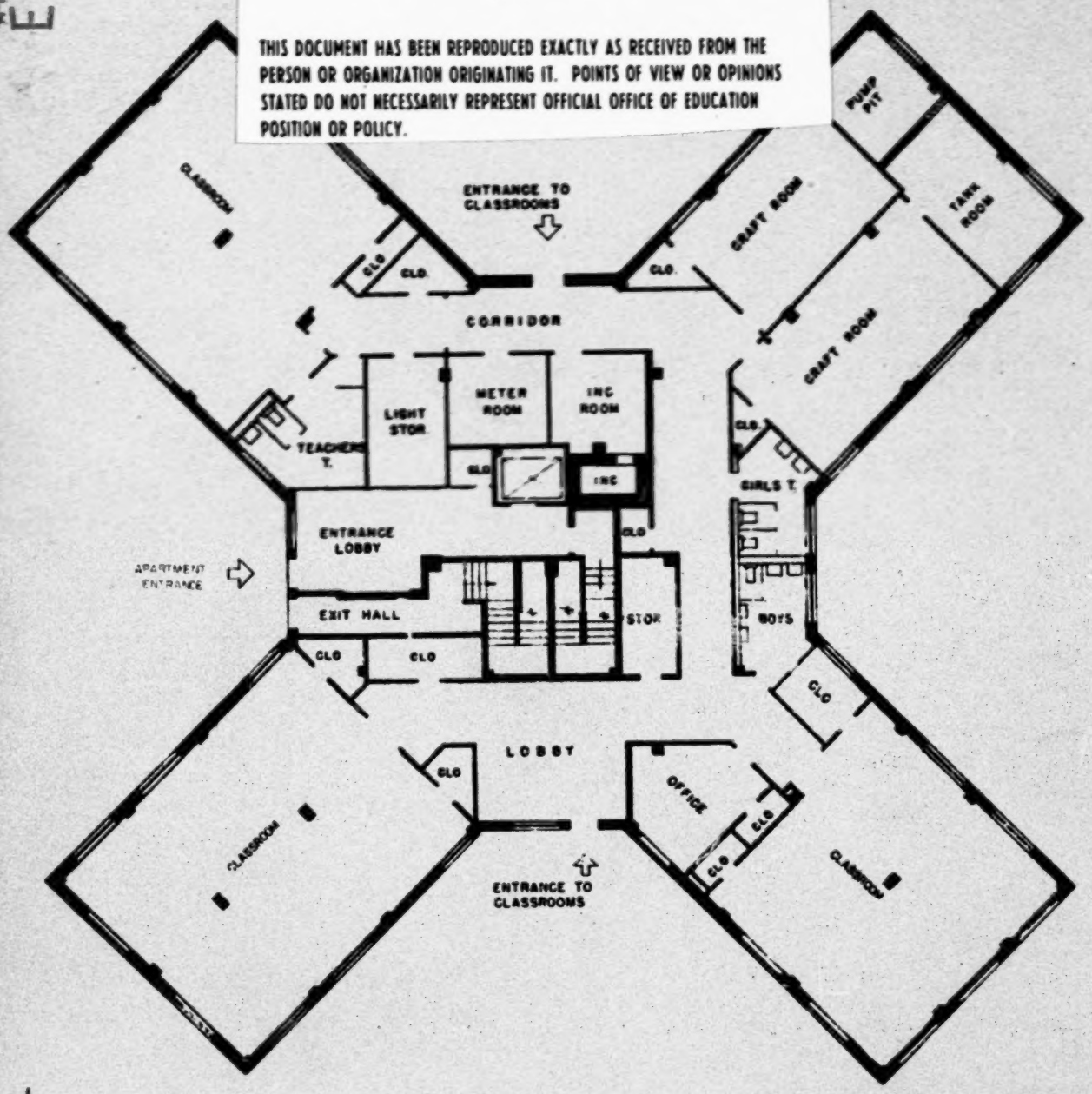

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SCHOOL PLANT PLANNING GUIDE

A REFERENCE AND GUIDE

FOR SCHOOL PLANT PLANNERS

AND SCHOOL BUILDING COMMITTEES

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CHAPTER I
INTRODUCTION*

The basic responsibility for the education of children, including the construction of the buildings in which this education will be provided, rests with the state. Under Rhode Island law, it is the duty of the State Board of Education "To study, review and make recommendations for the design, construction and location of school buildings when so requested by any school authority";[1,2] and it is the duty of the Commissioner of Education "To verify that school sites and school building plans are in accordance with laws and regulations".[3]

The actual responsibility, however, for operating the schools and for planning and constructing new school plants has been delegated by the State to the local communities.[4] The role of the State Department of Education as agent for the State, is to insure that a satisfactory minimum program is provided.[2]

In addition to this role, the State Department of Education has a responsibility to provide guidance and assistance to the local communities in their efforts to continuously improve their educational programs and the plants in which they are housed. Through the leadership provided, the Department of Education endeavors to fulfill its responsibility and assist in achieving its aspirations to establish a quality of education far above the minimum standards for all the children of Rhode Island.

The communities in Rhode Island vary in their ability to support education and in their willingness to accept new challenges and the laws of the State recognize these differences. The laws which have been enacted in Rhode Island in recent years put the State in a partnership role with each school district. Now, every district is guaranteed State support for the operation and for the construction of schools.[5] This new partnership role provides added incentive and reason for the State to assist local communities with their school housing problems.

This guide for School Plant Planning has been prepared to assist in the expenditure of the people's money so as to provide school facilities which will ensure the best possible education for their children. It is not designed, however, to include

solutions for all problems connected with the construction of school buildings. Rather, it is designed to suggest some of the important areas which should receive serious consideration by those who have the immediate responsibility for providing the physical plants in which our children are to receive their schooling.

It is not the intent to establish requirements which would lead to uniformity and mediocrity. Rather, the purpose is to establish guide lines which will lead to the construction of building which will permit the development of a superior quality of public education in Rhode Island.

This publication is intended primarily for the use of persons charged with the responsibility of school plant planning and construction. It is concerned with the designing of school plants to meet the present and future educational needs of the community and the concomitant responsibility for the conservation of public funds. While not exhaustive, it consists of essential recommendations pertinent to:

1. A frame of reference necessary for effective planning.
2. A set of guide lines for planners of school plants.

* The numerical notations throughout the text refer to the list of references in the Appendix.

CHAPTER II
FRAME OF REFERENCE

A. Development of Needs

The decision to erect a new school plant, or to alter or add to an existing plant, should be the result of careful study by the local planning committee. It should involve:

1. A survey and analysis of existing school plants both as to their normal capacity and their suitability for meeting the needs of the educational program in the years ahead.
2. An analysis of the present school population and a projection predicting the numbers and the geographical distribution of the population in the predictable future.
3. The formulation of a schedule of the needed construction of new plants and additions and alterations to existing plants.

This study may be conducted by the administrative staff with the assistance of school personnel, school committee members, and community representatives. The school committee may choose to engage a consultant or to request the State Department of Education to make the survey.

Such a study, with its resulting recommendations, provides the community and community officials with the necessary data to make intelligent decisions with respect to the provision of funds for the acquisition and improvement of school sites, the construction of new buildings, and the alteration of existing buildings.

B. Organization and Function of the Planning Committee

In anticipation of needed school construction, a planning committee with various sub-committees, is most desirable. It should be organized by the School Committee and the Superintendents of Schools. Included in its membership should be members of the School Committee, the administrative staff, the instructional staff, parents, and representative members of the community. Encouraging the participation of parents and community members in the planning process can serve as an unequalled method of educating the community with regard to the values, needs and necessary costs of public education.

It should be clear to all members of such a committee that its role is that of advisement based upon its findings. All

matters of policy and all final decisions will remain the sole prerogative of the School Committee and the Building Committee.

This planning committee should familiarize itself with:

1. The philosophical concepts fundamental to effective school plant planning.
2. The importance of constructing facilities which will provide for the needs of the pupils and how best to meet these needs.
3. The curriculum to be accommodated and the facilities necessary for its effective implementation.
4. Considerable information concerning the efficient operation of the school plant.

If this committee is to function effectively, there will be extensive reading and exploration of research, consultation with experts, visits to newly constructed school plants, and much discussion to evaluate the ideas and proposals of its members. The final recommendations of the planning committee might well be in the form of education specifications. If not, they should provide a sound basis upon which staff members may then formulate such specifications.

C. The Planning Committee and Basic Concepts

Certain philosophical concepts fundamental to effective school planning, as well as check lists and itemized recommendations, have been developed and published by a number of qualified experts in the field of education. Such materials may be obtained from or through the State Department of Education as well as from those larger universities which have bureaus of school service organized and in operation.

A review of such publications will reveal the fact that most consultants in school plant planning have reached concensus on a number of principles. Probably the first task of the planning committee should be the study and analysis of such data to provide a proper foundation for its subsequent activity.

D. The Planning Committee and Pupil Needs

Since school buildings are constructed for the purpose of educating children, they should be specifically designed for that purpose. There must be an evaluation of the needs and interests of the children to be served together with considera-

tion of their special characteristics.

Planning school buildings which are appropriate for the age range to be accommodated calls for careful study and foresight on the part of all concerned. This becomes a controlling factor in all decisions of the planning committee.

E. The Planning Committee and the Curriculum

In a very real sense school plant planning means curriculum planning. To develop a curriculum which is suitable for the children of the community and for people living in a free society, school plant planners should avail themselves of all the useful information available if they are to plan with foresight.

There should be a careful study of the community in terms of its resources and its potentials for growth and development; the needs, interests, and characteristics of the children involved; a fearless inquiry into the latest information deriving from qualified experimentation into learning theory, methods, techniques, and materials of instruction; and an exploration and analysis of the opinions of experts in the fields of educational psychology and research.

The methods and procedures for making a thorough study of the curriculum to effect proper revisions are known to the educational staff. Hence, it is not the intent to establish guide lines for such in this document. Rather it is emphasized that such a study and analysis should be made before educational specifications are drawn, for the curriculum is the second controlling factor in their determination.

CHAPTER III
GENERAL GUIDE LINES

A. Meeting Instructional Needs

All the facilities needed for a high quality of education should be included in the plans. The educational specifications formulated as a basis for the architect's design should insure such a result. The proper allocation of space, and the provision for facilities and services essential to efficient instruction should be paramount in the overall design. Communities cannot afford education housing which fails to make possible a high quality of education.

Further, the school should be a comfortable, convenient and attractive place in which to work. The functional concept of the building must be given first consideration. However, beauty, comfort and convenience may be provided at no extra cost through careful planning and design.

B. Conservation of Funds

There is no justification for the expenditure of public monies on unnecessary elaborations in school construction or for the inclusion of features which fail to meet real instructional needs. Experts in the planning and construction of school buildings agree that there are safeguards by which school administrators and committee members may avoid the pitfalls of over-elaboration, built-in obsolescence, and constriction, as they seek the best possible housing for their children.

The percent of usable space ascribed to instructional purposes varies considerably from one school building to another. Adequate service, pupil circulation, and administrative areas are essential to the efficient operation of a school building. However, a valid criterion for assessing the efficiency of architectural plans is the percentage of the total area of the building which is allocated to instructional purposes.

A high percentage of space allocation for instruction presents a challenge which all architects should welcome and which all educators should emphasize in the evaluation of school plant designs. Uninhabitable areas should be kept at a minimum. The space required for administration, pupil circulation and service facilities should be adequate for the proper operation of the functions involved. But the percent of the

total space devoted to actual instruction should be as high as possible. This will mean a greater return on the community's financial investment.

C. Health and Safety[2, 6]

Safety is, of course, one of the important factors to be considered in the original selection of the school site. There should be particular concern for existing or probable future traffic hazards. Natural hazards accruing with the site such as rock ledges, marsh, stagnant water, brooks, ponds, steep slopes and so forth, should be given attention.[7] Site development should be pursued in such a manner as to preclude the addition of new hazards.

Equally important to matters of health and safety are such factors as drainage, water, sewage facilities, air pollution and loud or persistent noise.[7]

All buildings must be structurally sound. They should be kept free of fire hazards and should include ample facilities for the evacuation of children, and fire protection signals and warning devices.[21, 22, 23, 24, 25]

Every care must be taken to protect the health and safety of pupils. Construction must permit the regular maintenance of sanitary conditions in all parts of the building. Naturally, all state and local legal requirements in this regard must be met.[6, 7]

A properly designed incinerator of ample capacity should be a feature of each school building. Schools having kitchen facilities should give careful consideration to the means of garbage disposal.

Parking areas, driveways and, particularly, loading zones should be located so as to eliminate traffic hazards wherever possible.

D. Flexibility[6]

Flexibility in design should be a major aim of persons charged with the responsibility of school plant planning and construction. School plants should not only meet the needs of the educational program in current use, but should be adaptable to changes which may take place in the forseeable future as well. Prevailing theories relating to curriculum, instructional methods, teaching techniques, materials of learning, and uses of community resources are undergoing marked

change. Such changes may be many and varied within the usable life of the building being designed.

While it is not possible to plan completely for the unknown, it is possible to design buildings in such a way that changes may easily be made as circumstances require. Interior walls should be non-bearing and as free as possible of conduits, pipes, and other permanent items of construction which would make it difficult to change or remove them.[6]

If the current program of instruction indicates the need, a limited number of folding or movable partitions should be provided at the outset. Careful thought especially should be given to the use of movable partitions in the auditorium and cafeteria so that several small instruction stations may be made available for use throughout the school day.

Corridors, and particularly stairwells, should be strategically located so as to enhance the flexibility of lay-out, and thus make it possible for changes to be made in the floor plans as conditions may determine.

Related instructional stations should be clustered where possible. If unrelated classrooms are located side by side, the very nature of the room design militates against good working relationships among staff members, and creates supply and storage problems. Later changes become prohibitive as far as cost is concerned, especially where expensive installations have been made.

Clearly the ingenuity of the architect is challenged when the instructional program demands a design which has maximum flexibility both for the present and for accommodating educational change in the future.

E. Adaptability

The use of school buildings by the community for other purposes than day school instruction is growing. This trend will doubtless continue. Thus, multiple use of school buildings requires that adaptability should be built into construction plans. Persons involved in school plant planning must be familiar with all sources of information which will permit them at all times to be acquainted with any changes in services and functions which will be taking place in the future.

Provision should be made for opening certain areas of a school building to public use while closing others. Efficiency of function in such a case warrants planning for the use of

zoned heating and air conditioning, and the proper location of toilet and lavatory facilities, drinking fountains and access routes. In the expectation of evening use by adults, adequate equipment, storage facilities, and lighting should be included in the plans.

The use of a building, or portions of it, by school-age children during after school hours, or week-ends, and particularly during summer months has similar implications for planning.

F. Expansion[6]

Future expansion must be considered by the planners of school buildings. The implications for adequacy of site are obvious where the likelihood of expansion in the future is a probability. Building expansion should not take place at the expense of play areas and outdoor physical education and athletic space.

The total design of a building should be such as to permit expansion without interfering with the beauty and usefulness of the building. Preliminary plans should specify where and how additions may be made. Adequate planning for expansion includes consideration of capacity of the building, and the proper location of various service facilities and heating and ventilating equipment.

Probable needs for the enlargement of particular departments should be considered at the time original plans are drawn by the architect. It is usually desirable to anticipate such possibilities for industrial arts, home economics, science and other specialized offerings. In all cases, the additions should be in reasonable proximity to the related instructional stations.

G. Maintenance and Durability

It is important to the economy of a community to obtain school buildings which are durable and, at the same time, easily and inexpensively maintained. Some construction materials, while durable, lose their useful value because of high maintenance costs.

On the basis of experience and research, durable materials should be used in construction. A saving in the initial expense of material may be more than offset by the cost of replacing an inferior material.

All materials used in school plant construction are affected

in time by weather, temperature change, moisture, dust, light radiation, and occasional saturation from several sources. Exterior materials should be capable of withstanding the rigors of winter freezing and the aging process of the sun's radiation. Constant expansion and contraction during the changes of seasons demand that seams, embrasures, fittings and binding surfaces adapt themselves to a variety of conditions without undue deterioration.

Materials used both outside and inside the structure should require as little cleaning and repair as possible. Those which rust or corrode should be avoided. Painting should be kept at a minimum. Porous materials should be eliminated from construction plans where their use results in unsanitary conditions and where replacement is costly. All plumbing and wiring should be initially planned and installed so as to make repairs which are inevitable, comparatively easy of achievement. Fixtures should be selected on a basis of maintenance as well as serviceability.

Schools are occupied by children. The less materials will be affected by the actions characteristic of this age group, the less expensive they will be to maintain.

H. Shelters[33]

Persons planning school buildings should weigh carefully not only the emergency use of the building in case of community disaster but the desirability of providing special protection, appropriate to the modern techniques of warfare, for pupils who may be confined to the building.

With recent research on stress-strain analyses of construction materials, it has been possible to reduce costs of construction. However, the resulting buildings, while serviceable for their intended purposes, do not provide effective protection against shock and radiation. The elimination of basements and the extensive use of glass renders school buildings especially vulnerable to rigors of missile warfare. Planners must decide what protective techniques are required to meet the needs of emergency conditions.

Architects and construction engineers have the knowledge with which to provide adequate safeguards for the occupants of school buildings. These types of construction require materials and methods of use, including elements which must be available in a series, if real protection is to be achieved. The committees planning and approving specifications for building construction must decide the extent to which they are willing and able to defray the necessary costs.

CHAPTER IV
SCHOOL SITES [6, 7, 8]

The following suggestions are offered for School Committees, which are responsible for the selection of school sites, and for other officials involved in their acquisition.

A. Location

1. To the extent possible, school sites should be centrally located with respect to the population zone to be served. This calls not only for normal population projections but also for predictions concerning future residential and commercial development.
2. In general, school sites should be surrounded by areas zoned as residential. An extensive area designed for business and industry adjacent to the school site means that the school plant will be uneconomical, or that transportation costs will be adversely affected.
3. Long range planning relative to the acquirement of school sites will include criteria pertaining to present and future locations of parks, playgrounds, libraries, museums, art galleries, and so forth.
4. The multiple use of a given site for both elementary and secondary schools, or for buildings other than schools, is generally undesirable.

B. Characteristics

1. It is recommended that School Committees avoid the site which might be too small for adequate use.[6] If a site proves to be too large, excess land may be disposed of through usual market procedures, whereas insufficient land area becomes a problem of increasing proportions as growth and expansion become necessary. Committee members should establish minimum requirements for school sites which will include not only the principal building but possible future additions to that structure along with necessary outdoor instructional and recreational areas.
2. The general shape of the proposed school site should take into account the specialized needs of school plant and school program. The site should be adaptable to educational purposes. Sites which have been selected primarily because they have a low market value due to

odd dimensions or developmental drawbacks may prove to be expensive in the long run.

3. An engineering study of the site is desirable before a final selection is made.

C. Health and Safety[6, 7]

1. Traffic hazards and transportation convenience should be carefully weighed in the selection of school sites. Master plans for the layout of plots should be analyzed with the assistance of persons responsible for planning traffic routes so that clear conceptions of traffic flow, vehicular and pupil, may be obtained.
2. Drainage problems should be considered thoroughly in the selection of school sites.[6, 7]
3. The School Committee should be fully aware of projected plans of the State Department of Highways, since heavily traveled roads constitute traffic hazards for school children unless adequate under-passes, over-passes, traffic feeder ramps, and service routes are included in master plans.
4. Traffic routes dividing school sites are undesirable. In some instances, it may be possible for the School Committee to have a right of way condemned and added to the school site.
5. See references under (III), General Guide Lines, Health and Safety.

D. Economy

1. School sites should be acquired well in advance of actual need in order that land purchases may be completed economically. Of importance to such purchases are matters of population projections and housing development.
2. In view of the fact that filled land ultimately may become uneconomical due to the processes of erosion and improper drainage, any use of such lands should be most carefully weighed utilizing the advice of competent authority.

CHAPTER V
INSTRUCTIONAL AREAS

A. Number and Size of Rooms[6, 7]

1. There should be a sufficient number of instructional stations to provide for the anticipated enrollment in groups of a size that will permit a high quality of education. The size of instructional groups is a matter which demands serious and continuous study and evaluation by all members of the instructional staff.
2. Suggested standards are available for the square footage of floor space (per pupil) desirable for various types of instructional activity.[6] However, educational programs and procedures change and differ from one community to another. Hence, establishing recommendations for areas, which might become optimum rather than minimum, is undesirable. Each community must explore its own needs and potentials and make decisions accordingly.

B. Elementary School Buildings

1. Current practices would suggest the advisability of self-contained classrooms designed to house not more than thirty pupils each. There are indications that smaller classes will improve the quality of education. Communities preferring to use departmental or team teaching in the elementary grades may wish to provide both for larger and smaller groups of pupils.
2. There should be some small instructional areas where groups, limited in size, may be taken from regular classrooms and given specialized instruction, including remedial or intensified teaching for slow learners, enrichment for gifted children, and special education for exceptional children.
3. In the past elementary classrooms, except for the kindergarten, have been standardized as to size and facilities included. It is conceivable the established standards may constitute a sound pattern for many years. However, since school buildings are continued in use for fifty years or more, consideration should be given to the adaptability of classrooms in future years. Planning committees may wish to provide for more specialized types of instruction, or individualized teaching. For flexibility it

is thus suggested that classrooms should not be too large, that various facilities be accessible to all rooms, and that dividing partions should be readily removable or movable.

4. See references under (VI) Auxiliary Instructional Areas, (VII) Auxiliary Areas, and (IX) Service Facilities.

C. Secondary School Buildings[6]

1. It is important that the educational specifications for a secondary school building be based on the projected curriculum and the types of instruction to be provided in the various areas of learning. There are differing requirements as to the size of rooms and the facilities to be provided for most subjects taught at the secondary level. Thus room size and facilities to be included cannot be fixed arbitrarily. For the purpose of achieving established objectives, minimum figures may be determined through careful consideration of the educational activities.

   The Superintendent of Schools and the School Committee should provide leadership relative to the problem of building flexibility into the design of secondary school classrooms so that the children of the community will not be at a disadvantage in the years ahead.

2. While the general practice in designing regular classrooms for the secondary school has been in the direction of standardizing room plans, there is a growing need for specializing the designs so as to provide facilities for differing types of activities in many areas.[6] Conference rooms, study and research areas for individuals and for small groups as well as large groups, together with work and laboratory stations should be considered. Faculty requirements in terms of facilities for the forseeable future constitute one of the major determining factors in the planning of floor space.

3. Recent innovations in educational methods, such as core programming and team teaching have not been completely standardized and find expression in differing ways. If members of the faculty are concerned with experimenting with new procedures of specialized educational method, careful consideration must be given to types and sizes of pupil activity areas to be made available. Matters of this type constitute special prob-

lems which merit special answers in terms of local school needs.

4. It appears certain that in the future there will be increasing use of both small and large group instruction. Obviously, proper housing facilities should be made available.

5. The following subject matter areas have been rather firmly established as intrinsic aspects of comprehensive secondary school curricula.[6, 8]

   a. English, including drama, speech, and journalism[6]
   b. Mathematics[6]
   c. Science[6]
   d. Social Studies[6, 9]
   e. Foreign Languages[10]
   f. Industrial Arts and Crafts[6]
   g. Home Economics[6]
   h. Commercial Subjects[6]
   i. Art[6]
   j. Music[6]
   k. Physical Education and Health Instruction[6, 11]
   l. Library Service and Instruction[6, 12]
   m. Guidance Service and Instruction[6, 13]

   The types of courses to be offered will determine the size of rooms in each of the above-mentioned areas. The anticipated enrollment in the various courses will determine the number of rooms needed in each instance.

6. The language laboratory appears to be a valuable facility for instruction in foreign languages and has additional possibilities for use in other fields of learning. Such a laboratory should be given consideration at the secondary level.

7. In planning secondary schools, thought should be given to providing for post high school and adult education classes.[14] It has already been demonstrated in many schools that providing special storage facilities for such classes, separate from the usual storage space provided for regular secondary students, is a sensible procedure.

8. Science areas[6] require special facilities which necessitate careful planning. The following are some suggestions

relating directly to such planning.

a. Specific types of activities must be considered in the planning of science areas. In general, these activities consist of demonstration-lectures by the teacher, experimental work by the students, group discussions, and individual or small group research and study.

b. The extent to which closed circuit television may replace the demonstration-lecture constitutes a factor worthy of consideration.[31]

c. Spaces and facilities to be provided should be determined by the curriculum.

d. Gas, electricity, and hot and cold water are necessary utilities for most science classes. Sinks and traps should be acid resistant. Careful consideration should be paid to the matter of smoke and fume disposal.

e. Properly designed and equipped dark rooms for photographic work are valuable accessories for science departments.

f. Thought should be given to providing for activities in botany and zoology. The presence of facilities which permit growing and experimenting with beds of plant life and small live animals are becoming earmarks of well-equipped secondary school science programs. If such facilities are provided, temperature control must be seen as a vital necessity. Ventilation techniques tailored to the needs of such facilities, plus the provisions for ease of maintenance and sanitation, constitute important requirements for such areas.

g. In keeping with the advancements in modern astronomy and meteorological science, thought might well be given to the addition of facilities for weather study and astonomy either in special courts or at protected roof stations.

h. Due to the nature of materials used in science, safety precautions must be reflected in the kinds of equipment and storage spaces provided.[21,28,29] Protection against accident and fire requires that all modern safety devices, alarms, signals, and emergency exits be included in the planning stages.[21, 22, 25]

i. Adequate storage for supplies and equipment is es-

sential in the science area.[6] The teacher should be able to control access to and use of supplies and equipment. Space ascribed to storage may be so designed as to meet the needs of individual classrooms, or may be strategically located between rooms so as to serve dual needs.

j. The educational specifications for science areas should include details as to the types of built-in equipment and the location of service facilities desired.

9. Areas for commercial instruction[6] have characteristics which make them unique among classrooms, and should be planned in keeping with the following recommendations.

   a. Educational specifications should set forth clearly the types of spaces and facilities required for the program of commercial education.

   b. Since the commercial department should be delegated responsibility for some of the actual business work of the school, there is an advantage in locating such instructional stations in proximity to the central administrative offices.

   c. Due to the fact that commercial classrooms may be used extensively in the adult education and post-graduate programs,[14] the provision of zoned heating and easy access from the outside constitute implications for planning.

   d. For those commercial activities which are composed largely of drill and individual practice, it is possible to make use of larger classroom areas. Specifications for such spaces should be included in the recommendations to the architect.

   e. For much of the commercial equipment, electrical outlets will be essential. The location of such outlets should be planned carefully. It is well for persons establishing the educational specifications to consult not only experts in school plant design but the individuals who will be teaching such classes. Once outlets have been installed, changes or modifications are expensive and inconvenient.

   f. Consideration might be given to the matter of including a space designated as a school store, and an area devoted to the business activities of student organizations.

10. Art areas[6] have been included in secondary schools in a variety of ways. The following recommendations are offered on the basis of the growing philosophy that art experiences constitute an important part of any secondary school program.

    a. Space allocated for the art department should be adequate for the variety and types of activity to be included in the program. While concepts as to what types of activities should be included differ from one community to another, sufficient space should be provided so as to permit conducting a wide diversity of activities simultaneously.

    b. The nature and location of the necessary built-in equipment should be carefully planned and the architect provided with the required specifications.

    c. Work sinks with hot and cold water, special traps, numerous electrical and some gas outlets are essential to the conduct of an effective program.

    d. A properly ventilated spray booth is important to the art program.

    e. If the study of ceramics is to be included in the art program, a separate kiln room should be provided.

    f. Careful attention should be given to the proper storage of supplies for student work, both within the room and in a separate storage area, giving due consideration to the nature and variety of materials to be handled. Also protection against combustion, proper storage of flammables[21] and adequate ventilation should be planned in advance.

    g. Suitable display areas should be provided for art exposition, not only in terms of glass enclosed cases for art objects, but also for the display of paintings, photographs, sketches, and the like.

11. Music[6] (instrumental, vocal and appreciation) has become well established as a secondary school activity. Well-designed space and appropriate facilities are essential for a high quality of instruction in this field. Educational specifications for the architect should supply him with specific information as to the needs of the music program. The recommendations which follow are offered in consideration of the usual educational experiences made available to students in secondary schools.

a. **The area allocated to music should include space for individual as well as group practice and rehearsal.**

b. **Areas should be provided for both choral and instrumental music.**

c. **Listening rooms are helpful to the educational aspects of musical appreciation.**

d. **Adequate storage for instruments, portable equipment, supplies, uniforms and robes should be carefully planned. Special storage space for sheet music and recordings should be included.**

e. **Proper acoustical treatment of all areas to be used for music instruction is most important both as to sound quality and sound containment.**

f. **Placement of the music wing in close proximity to the auditorium with ready access to the stage permits more effective preparation for and participation in auditorium activity.**

12. Home economics[6] instruction of a high quality requires attractive instructional stations which meet the varied needs of secondary, post-secondar and adult education. The suggestions below are made consideration of the latest recommendations for the use of this important instructional area.

a. **School plant planning personnel should avail themselves of the thinking of faculty members as well as of outside experts in planning the educational specifications of home economics areas. Types of activities and related storage space needs present special problems peculiar to this area of education. Built-in equipment should be considered in conjunction with portable equipment at the time space allocations for classroom activities are made.**

b. **Homemaking is an educational objective of prime importance on the junior high level, and to a considerable degree on the senior high level as well. A high quality of education in this area is significant and areas should be planned accordingly.**

c. **At the senior high level, some areas of specialization may be closely related to the vocational objectives. Where this is so the facilities for these areas should be designed specifically with these relationships in mind.**

d. The location of water, electrical, and gas outlets should be discussed with the architect to insure an adequate number of teaching stations properly located to achieve efficiency in instruction.

e. Storage problems in this area of education are unique and call for careful attention to needs. All the equipment, materials, and supplies to be used in home economics areas should be properly and easily accessible.

f. The use of stoves and a variety of electrical equipment require suitable safety precautions and emergency equipment.

13. Industrial Arts[6,23] like other specialized areas require particular attention to the allocation of floor space, the equipment needed, and the storage problems. The following suggestions are offered as a check list against which school plant planning personnel may evaluate their own thinking.

a. It is strongly recommended that industrial arts education be provided in all secondary schools.

b. Educational specifications for the architect should include the types of courses to be offered, the number and size of instructional stations to be included, the location of equipment, and the storage areas needed.

c. Junior high school shops should be designed and adapted to the instruction needed by all youth. General shops providing a variety of experiences should predominate.

d. Senior high school programs in industrial arts should tend toward more specialized instruction, some bordering on the vocational. Curricula in the industrial arts should not be established on a stereotyped pattern. Rather, the question as to what experiences and activities are to be included in the program should be resolved through careful study of the local community, its resources, and its potentials.

e. The location and safeguarding of special power lines for machinery, and the placement of electrical outlets and gas and water facilities should be carefully planned on the basis of the cooperative thinking of the faculty which will be using the areas.

f. Since a considerable number of small parts, tools, pieces of equipment, supplies, and materials are used in the industrial arts areas, specialized and ample storage should be provided.

g. Proper warning devices in case of emergency together with emergency equipment and necessary exits should be included in the planning so as to minimize hazards to the health and safety of students and teachers.[21, 22, 25]

h. In planning the location of shops, their heating equipment and their storage areas, the probable use of these facilities for post-graduate and adult education programs should be given due consideration.[14]

i. Shops should be located at ground level with doorways of sufficient size for the handling of machines and supplies.

14. Agricultural[15,23] subjects are included in the curricula of many comprehensive high schools. When the demands of the community indicate the need for such a program, provision should be made for shop areas with adequate facilities. The following suggestions may be considered in such instances.

a. The educational specifications for this area should be drawn by individuals who are thoroughly familiar with the educational programs to be conducted.

b. It is recommended that consideration be given to the provision of facilities for field work.

c. If this area is not likely to be used full time for the agricultural program, facilities should be included which will permit the scheduling of other classes in this shop.

d. See references under (13) industrial arts above.

15. Vocational Education[14,23] offerings at the high school level are currently in a state of flux in most parts of the country. The School Committee must explore and analyze most carefully its philosophy in regard to this aspect of the program. The recommendations which are presented below are made at a time when school committees may be developing plans which will vary considerably.

a. The local school committee must carefully determine

whether vocational education, other than that offered in the commercial area, is to be provided. Provisions for the types of vocational education to be established on the State level, together with State programs already in force, will materially influence these decisions.

b. If vocational shops are to be provided, they should be adapted to the present or planned industrial and business economy of the State.

c. See applicable reference above under (13) Industrial Arts, (14) Agriculture, (12) Home Economics, and (9) Commercial Areas.

16. Physical Education[6,11] including Health Education, constitutes another specialized area calling for close cooperation between the School Committee, the school staff, and consultants in the preparation of educational specifications which are detailed and well conceived. Increased leisure time resulting from automation in business and industry imparts new meanings to the importance of physical education which emphasize the following recommendations.

a. Separate gymnasium and field areas should be provided for boys and girls.

b. The boys' gymnasium should be large enough to provide a standard basketball court plus reasonable seating capacity for spectators.[25] Standards differ between junior and senior high schools in keeping with the physical characteristics of the age ranges being served.

c. Physical education facilities should be designed for intra-mural as well as varsity activity.

d. The number and size of dressing rooms and showers should permit the maximum number of class members to bathe and dress in a relatively short period of time. An adequate number of lockers and dressing benches, as well as sufficient space, contribute to the program by eliminating time consumption as students prepare for gymnasium activity and for the return to other school activities.

e. Materials selected for the floors of locker rooms, areas leading to the gymnasium or swimming pool, and the shower area should be of a type that will prevent slipping.

f. For convenient operation of the program, as well as for the health and safety of the students, careful attention should be given to the matter of the storage, dispensing, and disposal of towels.

g. Ample toilet facilities adjacent to dressing rooms are essential to the health of students.

h. Hair drying machines have proved desirable in girls' dressing rooms.

i. Storage space for equipment and supplies used in the gymnasiums, for field sports, and in specialized athletic programs, should be adequate.

j. Gymnasiums should be so located as to permit easy access from the outside as well as from inside the building. Zoned heating and arrangements whereby other areas of the building may be closed to the public when the gymnasium is in use, should be considered in the planning.

k. If a swimming pool[16] is included in the plans, particular care must be given to matters of sanitation and safety. Due to the weight to be accommodated in the structure, adequate construction must be insured. Construction materials should be selected to withstand the humidity which will be characteristic of such a facility. A reception area for those waiting to gain admission when the pool is opened for community use should be considered.

l. The inclusion of laundry facilities[30] may be warranted. Before planning and design is begun, a careful study should be made to determine whether it would be more economical to contract for this service, rather than provide for it with the building.

17. See applicable references under (VI) Auxiliary Instructional Areas, (VII) Auxiliary Areas, and (IX) Service Facilities.

CHAPTER VI
AUXILIARY INSTRUCTIONAL AREAS

A. Library[6, 12]

1. There must be a library center in each school building, adapted in size, service, and facilities to the instructional program and to the age characteristics of the pupils housed.
2. State standards for books, materials, services, and facilities must be met.[12] Recommendations of the American Library Association should be considered as suitable goals of the library program.
3. A suitable workroom for book repairs, indexing, and cataloging library materials should be provided.
4. Adequate space should be provided for the librarian. In all but the smaller school buildings, a separate office should be included in which the librarian may meet with small groups of assistants and pupils, conduct interviews, and perform routine office work.
5. In larger school buildings, a conference room and individual study areas might well be considered. The inclusion of glass walls in such areas makes supervision less difficult.
6. Adequate storage space for books, magazines, reference files, supplies, and materials is necessary not only in terms of sufficient area, but also to the degree that they serve needs of the children using them. If the library should be used as part of an adult education or post-graduate program,[14] the physical characteristics and needs of the individuals in these programs should also be taken into consideration in the planning stages.
7. The location of the library should receive careful attention. Convenient location in terms of pupil use during the school day is of paramount importance. Current trends in library usage indicate that continually greater use will be made of this facility outside of regular school hours. Hence, consideration should be given to the matter of making the library readily accessible without opening other parts of the school building. Implications for zoned heating and ventilation follow just as they did for other areas of specialized instruction.
8. The library should be a pleasant and inviting room. Proper lighting, acoustical treatment, and ventilation are important.

B. Auditorium [6, 23, 25]

1. At the elementary level, a general assembly room designed to seat all intermediate or all primary pupils is desirable for a varietv of reasons. While there are advantages in having a separate room for this purpose, the cafetorium designed for dual purposes has proved to be an acceptable answer to the problem.
2. At the secondary level, there are decided advantages in having an auditorium large enough to seat at least half the maximum enrollment.[6] If there are demands for a community assembly area, consideration should be given to including such a facility in the secondary school. In the larger secondary schools it should be possible to seat at least all the pupils of one grade at one time.
3. The many possible uses of the auditorium outside of school hours make it desirable to provide this area with easy accessibility from the outside. It should be possible to close other parts of the school building when the auditorium is in use. Zoned heating and ventilation should be designed for such a facility.
4. Proper acoustical treatment of floors, walls and ceilings is of prime importance in the auditorium.
5. The fittings, lighting, rigging, and dressing room facilities should be appropriate for school usage. More elaborate facilities may be justified on the basis of general community use.
6. The stage should be sufficiently large with the necessary depth to accommodate the relatively large groups using it.[23] It is well also to provide a fore-stage several feet in depth in front of the main curtain to allow for discussion groups, addresses, and small group activities.
7. A wide proscenium opening should be provided.
8. Adequate space for an orchestra should be provided immediately in front of the stage but a pit is not recommended.
9. In secondary schools, separate dressing room facilities for boys and girls are necessary, with toilet and lavatory facilities. Where dressing rooms are not included, toilets and lavatories adjacent to the stage should still be provided.

10. Adequate wiring together with suitable outlets should be provided so as to permit the use of a microphone and amplifier. Outlets and equipment plugs should be so designed as to make it impossible to mistakenly plug into standard electrical circuits. The location of speakers and electronic pickups should be designed on a basis of professional engineering advice so as to avoid the problems of feedback and electromagnetic noise.
11. Stage lighting should include ceiling spotlights, outlets permitting flexibility in the placing of floodlights, and a switchboard permitting the control, dimming, and complete shut-off of individual lights as well as battery lighting hooked up in series. Border lights are commonly used but their need should be questioned. It should be possible to control house lights both from the master switchboard and from the projection booth.[26, 27]
12. A sprinkler system is advocated both for the stage area and for the projection booth.[23] Otherwise, fire detection systems must be considered for these areas. There must also be provided adequate and accessible storage for fire extinguishers which will not interfere with normal operations on the stage.
13. Egresses must be carefully planned and strategically located throughout the auditorium area so as to permit of rapid evacuation in event of emergency.[25]
14. Fully adequate storage space adapted to school needs should be planned for stage properties and equipment.
15. Consideration should be given to providing for the division of the auditorium into several instruction areas through the use of movable partitions.
16. Reasonable storage space for the checking of outer garments of persons attending auditorium activities is desirable.

C. Cafeteria[6, 7, 17, 18]

1. The cafeteria has been accepted as a necessary part of the school. Dining facilities are usually essential in cases where students are transported to and from school. It contributes to the educational program through the opportunities provided to teach health, nutrition, and good manners.
2. In smaller schools, space may be provided so as to seat the entire student body. In larger schools, space is

needed for not more than one-half of the anticipated enrollment at any one time. Minimal plans call for a seating capacity of approximately one-third of the entire student body.[6]

3. The trend in design of dining facilities for secondary schools is toward double dining rooms, separated by folding walls or located on opposite sides of the kitchen. Such a plan is desirable not only because of noise abatement and ease of supervision but for purposes of providing additional instructional stations.
4. A separate dining room for faculty members should be included.
5. Possible expansion of the school plant makes it necessary for planners to anticipate the enlargement of dining facilities, inclusive of both the kitchen and dining area.[6] The multiple dining room plan enables the school to take advantage of simple enlargement but kitchen facilities must be adequate to handle the increased demand with but nominal change.
6. Since the dining area may be used for a variety of purposes after school hours[24,25] it should be so located as to make access from the outside convenient. It should be possible to close off other parts of the school building. Zoned heating and ventilation are suggested. However, if there is a question as to where the dining facilities might be located, the matter should be resolved in terms of the convenience of the students.
7. The design of the kitchen and service areas should be adapted to the types and quantities of meals to be prepared. Commercial restaurant kitchens do not make the best models for school situations. School plant planning consultants are familiar with the demands made of school kitchens and should be consulted with regard to the types of equipment that are more suitable for the preparation of school lunch programs.[18]
8. A dressing area for kitchen workers inclusive of toilet and lavatory facilities must be provided.[18] Lockers for their use should be included.
9. Modern storage facilities for foods call for absolutely sanitary conditions, adequate refrigeration and lockers for frozen foods.[18]
10. Modern dishwashing equipment provides the school with the most sanitary means of cleansing and sterilizing

cooking and eating utensils, and calls for water heating equipment sufficient to meet the need for large quantities of hot water. The location of such equipment must be designed so as to minimize hazards to workers and so as to allow for convenience.

11. A separate office might well be provided for the kitchen manager or director. The office should include telephone service. Glass partitions for such an office provide for easy supervision of the kitchen area.
12. A custodian's service room should be located adjacent to the kitchen area.
13. The return for eating utensils should be conveniently located and should be large enough to receive the utensils and trays from a line of students who are on their way out of the dining room.
14. Some acoustical treatment is called for in the dining areas. Since these spaces should also be used for instructional purposes during the school day, the transmission of sound from the kitchen area should be avoided, with particular attention to doors and the slide for dishes.

CHAPTER VII
AUXILIARY AREAS

A. Guidance and Counseling[6, 13]

Guidance and counseling services have been variously organized and administered in different school systems. Each type of organizational pattern requires unique facilities for the implementation of services. The following recommendations are based on the use of a centralized system which is generally accepted throughout Rhode Island. If another guidance pattern is to be used, these suggestions should be weighed in the light of the pattern used.

1. It is well to locate guidance and counseling services near the administrative offices so that both administrative and counseling personnel may have easy access to student record files.
2. In addition to a number of counseling offices for the interviewing of students and parents, there should be provided a waiting area, clerical space, a conference room, and storage space for files, testing materials and occupational and educational literature.
3. If a decentralized pattern of guidance and counseling is to be used, consideration may be given to locating counseling offices strategically throughout the building.
4. The use of guidance and counseling specialists at the elementary school level is receiving increased attention. Hence, consideration should be given to the provision of office space for such personnel in elementary school buildings.

B. Administration[6]

Space allocations for administrative offices should be designed in keeping with the size of the school, the type of school and the administrative services available within the school system. The following recommendations are based upon a consensus of thinking among educators and consultants in educational administration.

1. Every school should have a principal's office, inclusive of an area designed for clerical work.

2. Space provided for administrative services will vary with the size and program of the school. Efficient operation of the school is hampered by inadequate office space.
3. The main administrative office should be centrally located with respect to the instructional areas of the school. The main office should also be located near the major entrance.
4. The central administrative office should include a pleasant waiting area for visitors and pupils.
5. The principal's office should be large enough to accommodate small conference groups unless a separate conference room is provided in proximity to it.
6. The central clerical office should have sufficient area within which to accommodate the requisite staff and the necessary equipment, supplies and records. It should provide for the convenient reception of visitors and students.
7. A vault is desirable for protection against fire and theft.
8. In larger schools, assistant administrative personnel should have separate office space.
9. Office space is recommended for departmental heads, school publications, intramural and varsity athletic directors, custodian, and any other staff member who may be called upon for considerable specialized desk work or private conferences. Such offices may be located away from the central administrative office, preferably adjacent to the activity involved.
10. In secondary schools, some consideration should be given to the provision of office space for student administered activities.

C. Health[6, 7, 19]

Health, as seen apart from physical education, is a daily concern of students and staff members. Every school building should have a health room where children who are ill or injured may be isolated from the rest of the student body and where the school nurse or doctor may meet with students for examination or treatment.

1. The location of the health room should take into consideration the supervision to be provided.

2. In secondary schools there should be separate facilities for boys and for girls. The same situation is recommended for elementary schools.
3. The health room or suite should include facilities for the school nurse. There should be a separate office if a full-time nurse is to be assigned to the building.

D. Storage[6, 21, 28, 29]

There is a tendency to underestimate the need for storage facilities in school buildings. The recommendations listed here are made on the assumption that careful attention must be paid to the matter of storage space, much as individual planning is directed toward other specialized areas in the building.

1. There should be ample storage space provided. It is suggested that planning committees keep in mind the fact that the building should be adaptable not only for curricular changes in the future but should be so planned that changes in storage space needs will occasion no serious difficulty. The problem of too much storage space is far less serious a matter than too little storage space.
2. Each classroom should have sufficient built-in storage space for books and materials of instruction. Departmentalized instruction, team teaching, machine learning, and core programing all present the staff with differing problems of storage space allocation. Certain minimum storage areas in each classroom should be visualized so that no matter what direction methods and techniques take, the room will be adequate.
3. Storage areas in various curriculum centers, requiring the housing of specialized equipment, supplies and materials, should be carefully planned by staff members and educational consultants familiar with the specific problems involved.
4. There should be a main stock room in each building, usually located in proximity to the receiving platform or entrance from which supplies and materials may be taken to various storage areas throughout the building. This main stock room should be adequate for long and short range storage of expendable materials. The amount of space designated for this purpose will depend upon policies of the entire school system. If there are large central storage facilities for the entire system

from which periodic shipments to school buildings will be made, then storage areas in each building may be smaller. Where each building houses its own supplies received directly from suppliers, the building storage area will have to be larger.

5. In multi-storied buildings, it is desirable to have smaller storage areas on each floor in addition to the major storage space. Campus-type plants require a general storage area in each building. Large, single-story buildings call for several small auxiliary storage spaces strategically located throughout the building in addition to the main storage area.

6. There should be an instructional materials center, which is often associated with the library. Provision should be made for housing all instructional materials which may be used throughout the building by all or most of the departments or teachers. The items to be housed include projection machines, record players, tape recorders, screens, tables, films, reels, tapes, recordings, maps, charts, models, physical education equipment in elementary schools, and such other equipment as may be provided by a particular school system. The needs will vary. However, if a high quality of education is to be maintained, there will be considerable equipment of this nature to be housed. The space should be adequate to permit the cataloging and the normal care and checking of the equipment and supplies.

7. Temporary storage space for students' books in or close to the dining area is a valuable addition to any secondary school. Such provision will reduce pupil traffic problems and conserve the pupils' time.

8. A frequently occurring oversight in the planning of lavatory facilities of secondary schools involves lack of book storage shelves in toilet areas. Such provision should be arranged when plans are being made.

9. Consideration should be given to the storage of custodial supplies and equipment.[21] In addition to a main storage area for the somewhat bulky supplies involved, several spaces should be strategically located throughout the building for efficiency of operation.

10. If automatic vending machines are to be used in connection with the cafeteria, it is recommended that alcoves be provided.

11. See applicable references under (V) Science, Art, Music, Home Economics, Industrial Arts, and Physical Education; under (VI) Library, Auditorium, and Cafeteria; and under (VII) Guidance and Administration.

E. Staff Lounge and Staff Work Room

Modern school buildings reflect consideration for the personal needs of staff members to the extent that lounges have come to be considered necessary to each school building. The following recommendations are offered for the consideration of school plant planning committees.

1. The amount of space designated for teacher lounges or rest rooms naturally varies with the size of the staff.
2. Separate toilet and lavatory facilities must be provided for male and female teachers in elementary as well as secondary schools.
3. Consideration might be given to the installation of kitchen facilities, inclusive of cooking units, refrigeration and storage space for utensils. A sink and drainboard, with hot and cold water, should be included. Compact units have been especially designed for such use.
4. Consideration might also be directed toward the provision of additional space as a planning and work area for teachers. Special lighting and built-in equipment should be investigated with the advice of consultants and staff members.

F. Student Activity Room

Current practice is to provide students with rooms for a variety of activities so that they will not interfere with classroom use or of necessity be scheduled after school hours.

1. In secondary schools, particularly, it is accepted practice to provide adequate space for student council and student committee meetings.
2. The area designated for student activity can also serve as a place where visiting students, parents, and speakers may be welcomed.

CHAPTER VIII
INSTRUCTIONAL AIDS

A. Chalkboard and Tackboard[6]

1. The amount of chalkboard and tackboard or pegboard to be provided in each instructional area will vary with the use to be made of the room as well as with the actual or anticipated methods of teaching. Planning committees should consult with the instructional staff about this.
2. The height of such accessories should be determined in keeping with the physical characteristics of the age range to be served within the classroom. Standards are available for such placement.
3. These instructional aids are made of a variety of materials. The staff should be consulted so that the decision as to which to choose will be based on instructional needs as well as cost.

B. Clocks

1. Modern school planning calls for the use of accurate electronic timing instruments throughout the building. Each school should have a master program clock which controls the operation of the clocks located in each instructional area and in all other associated areas.
2. Clocks should be scheduled on a twenty-four hour cycle so that day time schedules will not be sounding during evening hours.

C. Communications System

Vital to the successful operation of school programs is the matter of communication among all persons responsible for the execution of duties relating to the program. However, the communication system should be so designed as to facilitate rather than hinder instruction, administration and the operation of the school plant. The following points are listed in association with the goal of successful operation of the instructional program and the physical plant.

1. There should be communication between the central administrative office and each instructional station as well as such associated areas as the health room, guidance office, custodian's office and boiler room, other office areas, dining hall and kitchen, and teachers' lounge and work areas.

2. Public address systems should provide two-way signalling as well as communication. The central office should be able to communicate with each station individually, or in any combination with other stations. There should be an "all call" which will override any existing connections in case of emergency. A "listening" control is recommended for each instructional station.
3. In larger school buildings where public address systems constitute the major means of communication there should be at least a few intercommunicating telephones, strategically located, so as to provide for private conversations.

D. Television[20]

Closed-circuit television and open-circuit (broadcast) television are being used extensively throughout the country. Inevitably, schools will find the need for some type of TV service. When they do, there should at least be available conduit which would eventually carry TV cabling to all reception points in the school.

Since the nature of wired distribution systems is not expected to change appreciably, it is recommended that wiring be placed in conduit at the time of construction. The wired systems are of two types:

1. A master antenna system permitting the reception and distribution of any TV signal coming to the building either by wire or by air. This system is recommended for elementary schools.
2. A master TV system plus provision for orginating programming within a building and distributing it to points within the building. Such a system would permit live studio originations within the building or would make possible the playback of video tape recordings within the building. This expanded system is recommended for installation in secondary schools.

Specifications for either system have been prepared by and are available from the R. I. Department of Education.[34.]

E. Display Areas[6]

Aiding in the educational growth and development of children are the display cases and bulletin boards by means of which educational materials may be displayed and students can see their handiwork on exhibition. The suggestions which follow

point out those means by which this process of self-realization may be implemented.

1. A number of corridor display cabinets are desirable in elementary schools for classrooms, one for the library, and at least one for the lobby area.
2. In secondary schools, display cabinets might well be planned for each field of instruction. If fewer cabinets are provided, those which are included should be so located as to make them usable by each of several instructional areas.
3. Bulletin boards should be provided in each departmental area.
4. There should be several large corridor bulletin boards in all school buildings, one or more near the office, one for the use of the library staff, and others at selected locations. Some of these should be behind locked glass doors.

CHAPTER IX
SERVICE FACILITIES

A. Lighting 6, 7, 23, 24

1. Lighting is of vital importance to effective instruction and learning. Adequate standards of lighting are available and it is the responsibility of the architect to see that illumination standards are maintained in the design of the building.
2. There is considerable literature in the field of lighting and both architects and schoolmen should familiarize themselves with it and be aware of the various methods and fixtures available. Committees charged with the responsibility of school plant planning and construction should realize the futility of approving options which may save money initially but which leave children with inadequate lighting. The failure to meet minimal standards can result in hazards to the health and welfare of students.
3. Careful attention should be directed toward the special lighting requirements in such areas as mechanical drawing, art, sewing, and typing where the needs of students and teachers may be termed critical.
4. Architects have the specific responsibility of providing a satisfactory visual environment with emphasis on reducing glare and avoiding brightness contasts.

B. Heating and Ventilation 6, 7, 32

1. Desirable heating and ventilation standards are also important to instruction and to learning. Heating and ventilating engineers know what the specific requirements are for any given amount of space to be served. Committee members should insist that the architect furnish them with complete information as to the various systems available, their relative merits, and their operating costs.
2. Over-design is costly. However, persons responsible for planning should assure themselves that all usable parts of the building will be adequately heated; that excess heat will be safely carried away; that the oxygen supply conforms to acceptable standards; that odors are diluted and removed; that humidity is kept within reasonable limits; and that adequate temperature controls are included.

3. The growing tendency to use school buildings during the summer months suggests the installation of a heating system that can be readily adapted to cooling the building.

C. Acoustics

Efficient teaching and learning, as well as the demands of health and comfort, call for an environment that does not block or distract from the learning task.

1. Acceptable auditory conditions should exist within the instructional areas. A normal speaking voice should be heard in any part of the instructional station. Sounds emanating from one instructional area should not reach another except under unusual conditions.
2. Attention should be given to the appropriate isolation of learning situations which necessitate unusual noise. Special acoustical treatment of surfaces should be considered for areas such as the auditorium, music rooms, shops, typing and office machine rooms, and the cafeteria.
3. Where movable partitions are used, careful attention should be given to preventing any undesirable transmission of sound from one area to another. Also, the acoustical treatment should produce satisfactory auditory conditions in all parts of the instructional space when the partitions are opened.
4. Carpeting in certain areas may be an effective material.
5. In certain situations, proper acoustical treatment can be expensive. In such instances, the necessary expenditure should be balanced against the extent of the improved conditions for learning to be obtained.

D. Corridors, Stairwells and Exits[21, 22, 23, 25]

1. Corridors and stairwells should be so designed and located as to facilitate the movement of pupils from room to room. The capacity of the building will determine the amount of space needed for hallways and stairwells. Passage areaways would be designed to permit a rapid evacuation of the building in emergency situations.
2. The number, location, and size of exits must conform to all legal requirements and must be adequate for the capacity of the building and the arrangement of corridors and stairways. Obviously, dead-end hallways in juxtaposition to major traffic arteries should be avoided.

Care should be taken to make certain that too many double-loading corridors do not meet at doorways which cannot adequately handle the numbers of students leaving the building.

E. Floors

Floor coverings are a matter of concern and should be given close attention. Materials suitable for the movement of heavy equipment, for the conditions brought on by inclement weather, and for normal school traffic should be chosen selectively. The following suggestions may help towards that end:

1. The purpose for which the room is to be used should be considered in the design of the floor and the selection of the floor covering.
2. All floors should be warm, quiet, easily cleaned and maintained, and comfortable.
3. Any floor covering selected for entrance-ways should be suitable for heavy traffic during inclement weather.
4. To facilitate the movement of heavy equipment, the floors of shops and main storage areas should be of materials which will withstand such action.
5. Highly impervious materials are suggested for science and art areas where accidents may result in the spilling of chemicals, paints, and other materials.
6. Serious consideration should be given to the use of carpeting in classrooms and other selected areas.

F. Electrical Outlets, Plumbing, Gas[6, 7]

More and more frequently the use of electricity and gas is required for school programs. Careful attention must be paid to the location and the number of outlets. The following guidelines are offered in the interest of economy of construction, yet with the focus upon a fully effective program:

1. There should be an ample supply of electrical circuits within the building so as to prevent over-loading on any one circuit. There should be several double outlets in each instructional area.
2. As indicated elsewhere, the type and location of these various facilities should be carefully planned for specialized areas such as shops, home economics area, science rooms, art rooms, commercial rooms, the language

laboratory, library, auditorium, kitchen, and central administrative offices.

3. In kindergarten rooms, electrical outlets should be located where they are not readily accessible to children.
4. The location of outlets in the floor where water could easily enter and cause short-circuits should be avoided.
5. Work sinks, lavatories, drinking fountains, urinals and toilet bowls should be placed at heights appropriate for the physical characteristics of the children served by the school. Available standards may be consulted.
6. Where gas is used for instructional purposes, consideration should be given to a main shut-off valve for each room, exclusively controlled by the teacher in charge.
7. Electrical outlets and work sinks should be conveniently located for the use of custodial equipment.
8. It should be remembered that the architect may be able to suggest locations of utility lines and outlets that will be satisfactory for instructional purposes and economical to install.

G. Drinking Fountains [7]

Care should be shown in providing a sufficient number of drinking fountains which are conveniently located. The following guidelines are suggested:

1. It is desirable to have a drinking fountain in each elementary classroom.
2. The drinking fountain should not be combined with a work sink.
3. Fountains should be conveniently located in corridors.
4. Areas which may be used independently of other sections of the building should have an adequate number of drinking fountains conveniently located.
5. Drinking fountains must adhere to current standards of sanitation.[6, 7]

H. Work Sinks[6, 7]

Work sinks enable instruction to reach into a wide variety of learning fields. The following information is offered as a guideline in planning this aspect of the school plant:

1. Hot and cold running water should be available at each work sink.

2. Each elementary classroom should be equipped with a work sink.
3. Work sinks should be provided as needed in all specialized areas of instruction.

I. Lavatories[6, 7]

Health and cleanliness require that careful consideration be given to the location of facilities for washing. The following suggestions are advanced:

1. The work sinks provided in elementary classrooms will supply adequate washing facilities for the pupils. This is true also in art, home economics and science rooms.
2. Industrial arts and vocational shops should have lavatories located preferably near doors leading out of the teaching areas.
3. Lavatories are essential in health rooms and kitchen areas.[18]
4. Lavatories should be located adjacent to dining halls, so designed as to allow for a large number of students to wash their hands in a short space of time.
5. Lavatory facilities are a requisite in all toilet rooms. Mirrors should be placed in these areas at heights consistent with the age characteristics of the children served. They should be located away from lavatories rather than over them.

J. Toilets[6, 7]

The following suggestions are aimed at meeting minimal needs respecting toilet areas:

1. Accepted standards should be adhered to with respect to the number of toilet bowls and urinals to be provided.
2. General toilet areas should be conveniently located throughout the building.
3. As indicated elsewhere, there should be appropriate toilet facilities connected with kindergarten rooms, physical education areas, back stage areas, health rooms, teachers' lounges, administrative offices, kitchens,[18] and custodians' offices.
4. Appropriate facilities, conveniently located, should be provided for both male and female teachers.

5. Areas subject to evening use by adults should contain toilet facilities which will be available when other parts of the building have been closed to use.
6. Wall-hung toilet bowls and urinals permit of easier cleaning resulting in more sanitary conditions.

K. Wardrobes and Lockers[6]

Adequate wardrobe or locker space must be provided for the students as they enter school for the day, and again as they find it necessary to don special clothing for various educational activities. The following recommendations are offered in the interest of facilitating this aspect of school service for students and other persons using the building:

1. In secondary schools, wall lockers for pupils are usually located along corridor walls, preferably recessed. Such service might be considered for students in the upper grades of the elementary school.
2. Where classroom wardrobes are used in elementary schools special attention should be paid to the mechanism for operating the door or doors.
3. All lockers or wardrobes for outer clothing should be well ventilated.
4. Various locker arrangements for the storage of gymnasium clothing are possible. The strength and weaknesses of these plans should be weighed by the planning committee and the instructional staff in order to select the one which best meets the needs of the program and of the students involved.

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